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Eric A. Cargun (Dapartent of Barth, Atmospharic, and
Finckary Sciences, Massachusetta Instituta of
facthology, Cubridge, Na 02199, John L. Rabelek and
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Frintlary Sciences, Messachapetta Institute of fachnology, (topologe, Na. 2019), John L. Asbelek and Sain C. Solomo Index, Na. 2019), John L. Asbelek and Sain C. Solomo Index National Science of Sain C. Solomo Index of Sai

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8170 Testinophysics iStlucture of the littorphore)
A HICHMITS and THEMMAL HODEL FOR THE EVOLUTION OF THE VICISION ARMY
J. L. Abres (School of Geology and Geophysics, University of Oblahoma, 70019) and S. S. Hilvish

THE TOTAL STATE OF THE STATE OF

SINO Plate tectonics
THE MORPHOLOT OF PROPAGATING SPREADING CENTIES: NEW AND OLD

J. Augustick (Scripps institution of Oceanography,
the Jolia, California, 20091)
Recent Seabeam investigations over the East Pacific Rims in the northeast Pacific have shown the eviatence of a propagating spreading center at 18°N. Early results indicate that the propagating and dying ridges are not joined by a transform fault, but by a transition zone of orthogonal topographic lineations. Similar lineations are observed at 16°N and 107°30°W on the boastern side of a 5 my old propagating ridge. The acplitude and the complexity of the topographic signature of the former propagating apreading center is higher end greater than the presently active one, the hypothesis is edwared that the forcest propagating appeading center is a light of the plate a combination of two sets of leadforms. One set consists of the frozent propagation orphology of theoremity contrasted lithosphers which has undergone differential substitutes rether similar to the fracture zone topography of answorld discussed by Sandwall and Schubert [1921]. The second est shows the topography resulting from propagation. Other old propagating preading conters may be observed elsewhere in the Nave-Feeton trough, the Sauer scarp and the Rudson and Henry troughs. The fundamental resemblance between these justped ridges and fracture zone explains why they could be interpreted as Fractute zone in severi past tectonic reconstructions, issabsen surveys, jumped epreading centers.

J. Geophye. Ras., Earth, Paper 381912 BISU Plate tectonice SEGLUMAL DEFORMATION MEAR PALMDALE, CALIFORNIO,

Boad, Manio Park, Californie, 94025) and J. C. Savage
The Takachapi Crilaterellon network spens the intersocition of the San Andress and Carfock Fautre is
couthern Californie in the "Sig Beed" region of the
San Andress fault. Analysis of data from 1973-81
couthern Californie in the "Sig Beed" region of the
San Andress fault. Analysis of data from 1973-81
coutheast regions of the solwork, spenning the San
coutheast regions of the solwork, spenning the San
Andress lawlt entirely within the Tahachapt network,
whowed increases of about I worrain in both east—cost
and outh-wouth esterion is lake 1978. The Tahachapt
streins also jumped at the time, but the magnitude of
the increase was only about one-third that of
Paladele. The principal stells rates for Sahachapf
work the film inherval 1871-80 ard" 4, 0.00 ± 0.01
agrain's and 1, 5-0.12 ± 0.01 patrioles, with the I
sais directed NISE. The principal stells rates for the
southeast Tahachapt region are 1, 0.14 ± 0.02
vatrain's and 1, -0.16 ± 0.02 vatrain's with the I
sais directed NISE. This result differs significranify from the principal strain rates are Paladelo
if 1 0.21 ± 0.02 vatrain's, vich the I
surrain's, with the I sais directed NISE. For the
footbreat Tehachapt region, t, -0.11 ± 0.02 battein's
only -0.00 ± 0.02 vatrain's, the Corthwest Tehachapt region, t, -0.11 ± 0.02 battein's
directed NISE.

1. Lappha, Nee., Enth, Paper 388/6 Paus or toos, J. Gaophys. Bes., B, Paper 450054 General or Miscellaneous 1. 1-2019755. Feb., Furth, Paper 3818/6 9840 Techniques (Signal Processing)
SUM RESOLUTION PREQUENCY DETERMINATION OF OISOUR

McJolche
The Williaton Sasin to a large, uttenior, introcrationic basin containing over 8 km oi additions rengish to our land basin containing over 18 km oi additions rengish to our triby. Sate on suvep for shift inner frap over 1300 walle in Mostens; South 1910 and and Market Datois work that to determine the shape of the basis over time. Sy assausing that the lithsphete behaves the outside in the characteristic the lithsphete haps of the basis result to classive matched using a

Vol. 65, No. 5, Pages 33-40

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HEM RESOLUTION PROCESSION

BING RESOLUTION PROCESSION DETERMINATION OF ORDERS

BINGS. COMMONNESSION.

C. K. Walton Electrical Engineering Department in the Majorithm is presented for the efficient and refining precision computation of the frequency of a significant in this where other components may be present. The betwings combines the advantages as Gaussian window with the computational efficiency in the fast Fourier Transform. The quantitative significant of indexired signal component sideliced interference with the desired signal are given. An emergia particular the frequency of a signal at approximately interference with the desired with a peculian which waits for Bests is measured with a peculian which waits for S.5 to 30 MHz as the transmitter power, is reduced to the property of a signal and provide the computation of the computa

January 31, 19.

As part of scientific activities of the Middle Atmosphere Program in Japan, the direct sampling of trace gases and acrosols in the lower stratosphere has been planned by using Merlin-IV aircraft. Most of the flights have been performed during winter, since Merlin-IV can reach the lower stratosphere only during cold seasons at latitudes of 36°-40°N. During the sampling flights, concurrent with the aerosol sampling, Os mixing ratios were mea-SITO STRUCTURE OF the lithosphers

STRESS AND RELAXATION TIME IN THE VISCORLISTE
LITHOSPHERE UNFREEND FROM THE CHIEF TOPOGRAPHS IN
FRONTAGE to RECEIVE TO THE CHIEF TOPOGRAPHS IN
Tack to Receive to the Viscorianto piets in
The deformation of a thir viscorianto piets in
moved by assigned by use of an equation that is
dorived with as attificial assumption of the
Poisson's ratio equat to 1/2. It is shown in the
paper that a stupic treatment applicable to as
orificate value. sured simultaneously from aircraft by using a modified airborne ozonesonde. The Os mix ing ratio is used as tracer of stratospheric air and, together with radiosonde records of the Japan Meteorological Agency's local weather stations is a good indicator of the height of paper that a study streamment applicable to an orientary value of Polyson's tails is possible in tendencing a new variable that represents the passible in the treatment of the passible in the treatment of the represent the passible in the treatment, a considerational stationary deformation of moving plate it slikes in staple analysic equation. This equation is seen in analyse the backpoorty of the outer toppgraphic is assured of the despresen traction. The weakjell examined that the ithoughers in the vestice Policians the seen is subject to an extensional backpoorties that the ithoughers in the vestice Policians have been as a reserved compressive to the salver may be such less or even compressive to the salver bending across from being extraordinarily large, is the salver of the salver or shorter, and the elivative viscosity must be it. For or there, and the elivative viscosity must be it.

Yews

Tridium at Kilauea

located stratigraphically at the Cretaceous-

Tertiary boundary are considered significant

evidence that the boundary is a record of a

large meteorite impact [Science, 208, 1095-

1108, 1980). In particular, trace metals, in-

eluding iridium and other members of the

plaimin metals group, are thought to be en-riched in rocks alien to the earth's surface.

These elements are indeed enriched in mete-

ornes relative to earth crustal rocks, but new

evidence from analyses of the January 1989

eruption of Kilauea suggest that the analogy may be invalid. W. H. Zoller, J. R. Parring-

ton, and J. M. Phelan Kotra reported nea-

fron activation analyses of airborne particu-

vatory and found "strikingly" large concentrations of iridium in addition to ele-

late maner collected at the Manna Loa Obser-

ment concentrations expected from volcanic

emissions (Science, 222, 1118, 1983). The only

was gold, which was also found to be anoma-

more data of other platinum group elements

and more data on other volcanos, but the im-

boundary may well be volcanic, not clue in a

The matter of the effects of large meleorite

impacts on the earth's surface probably will

not be settled by this study, and the question

boundary probably will not be answered satis-

learned from the Kilanea results is that trace

tightly bound, require broad geological analy-

the processes attendent to their origin are not

understood, and yet it has been acceptable to

assume their pristing role in our solar system

tion levels of primordial matter. More mean-

ingful for Zoller et al. was to look at enrich-

ment factors of Kilanea plume samples rela-

tive to Hawaiian basalt, rather than, say, only

to choudrites. For example, the iridium to

aluminum ratio in the plume samples was

found to be 17,000 times that of Hawaiian

Zoller et al. were careful not to overstate

the value of their observations as they may

reflect on interpretations of the Cretacious-

Tertiary boundary. They note immediately

sniall to have had world-wide effects. The

iridium content of the recent cruption was

only about 9 kg compared with 180 ktonnes

estimated for the mass of iridium deposited

along the Cretaceous-Tertiary boundary. But,

they also note that there were volcanoes that

had the necessary volume: "If volcanism was

instrumental in producing the K-T boundary

layer, the volcano was certainly not Kilauea

but may have been similar to the one that

formed the Decan Flood basaks."-PMB

Stratospheric

Sulfate Particles

that the Kilauea volcano of 1983 is much too

and in setting standard eleniciii concemra-

element constraints, often thought to be so

sis for their interpretation. Mercorites and

of the origin of the Creticcous-Tertiary

factorily either. What is important to be

other platinum-group trace metal analyzed

lously high. They concede that they need

plication is that the Cretacious-Tertiary

Trace-element anomalies observed in rocks

the tropopause along the flight track. On February 20, 1988, Merlin-IV sampled aerosols by impaction in the lower stratosphere over the Sca of Japan (36°-40°N. 137°E). During the sampling flight, we con-centrated efforts to obtain the actual molecular form of stratospheric sulfate particles by applying a vapor-deposited thin film of calcium as a reactive, particle-collecting surface. Chemical testing by the calcium thin film is a specific test for the detection of the sulfuric acid component in individual submicron partides under low ambient relative humidities

(A. Ono et al., Tellus, 35B, 197-203, 1983). Electron micrographs of stratospheric particles in the lower stratosphere at an altitude of 8.3 km, collected by impaction on a reactive surface precoated in vacuum with calcium, show that almost all particles etched a calcium thin film and formed reaction spots spread around particles. This indicates clearly that dominant particles were present as a liq-uid droplet in the lower stratosphere, and the most probable liquid which reacts directly with calcium upon impaction under stratospheric condition is obviously hydrated sulfu-

The morphology of particles collected on a carbon thin film at the same flight level

showed an appearance similar to that of sulfuric acid droplets characterized by small satellite droplets surrounding a central particle. Although the morphulogical identification of particle chemistry with electron microscopy does not always reflect the actual molecular form of sulfate particles, in the present case the morphology of the stratospheric particles supports the results obtained by a thin film ue of calcium.

This news item was contributed by Akira Ono. who is with the Water Research Institute, Nagoya University, Nagoya, 464, Japan.

El Niño Study

A National Research Council (NRC) com-mittee has laid the foundation for a condirated, decade-long study of the acean-atom sphere interactions associated with the El Niño and the Southern Oscillation. The plan describes itself as intended to "serve as a mechanism for engendering a vigorous international program required to address the The Sunthern Oscillation (SD) is a recur-

rent seesawing of atmospheric mass between the Pacific and Indian oceans in the troops and subtropics that plays have, with the global dimate by changing wind, temperature, and rainfall in the mension regions, the central and western equatorial Paritic, and throughout the tropics. The El Nino (EN), a related phenomenton, is an anomalous, periodic warming of the waters off South America that in turn affects atmospheric circulation patterns, producing erratic weather patterns. Together, the phenomena are known as

The Climate Research Committee of NRC's Board on Autospheric Sciences and Climate ondined the scientific rationale and adjectives for an ENSO program and sketched a blueprint of observational and research tongrams to address these objectives. "This global-scale and almost inescarably international research program is based on a number of existing or planned elements that have already been developed for other compatible motivations." the report states.

Entrent research programs sandying pairs of the Southern Oscillation "do not have a framework for coordination and overall managenicut commensurate with the global nature of the problem they are addressing," according to El Niño and the Sauthern Oscillation A Scientific Plan.

As outlined by the Climate Research Committee, the ENSO scientific program would center on three major companents. The first would monitor for a decade atmosphereocean interactions associated with ENSO; describe in more detail a representative El Niño episode spanning 15-18 months; and provide detailed information concerning the processes that control the sea-surfare temperature and the fluxes at the atmosphere/ocean sur-

The second component would deal with apprading and analyzing those historical data sets that describe ENSO events during the last 90 years and those that, though limited, describe ENSO behavior over the last century. The last component would focus on atmophere-ocean interactions relevant to ENSO and to developing the ability to predict ENSO

The ENSO scientific plan "is visualized as a United States] component" of the newly defined international program, called TOGA, that will study the interannual variability of the Tropical Ocean and the Global Atmo-

The committee concentrated on the study oudine and did not consider issues associated with manpower, resources, or costs.

Copies of the committee's 72-page report

are available from the Board on Atmospheric Sciences and Climate, 2101 Constitution Ave., N.W., Washington, DC 20418. Joseph Smagorinsky is chairman of the Climate Research

Geophysical Events

This is a summary of SEAN Bulletin, 8 121, De-This is a summary of SEAN Buttern, 4|12, December 31, 1983, a publication of the Smithsonian Institution's Scientific Event Alert Network. The Mr. St. Helens, Sakurajimn, and earthquake reports are all excerpts. The complete bulletin is available in the microfiche edition of Ear as a microfiche supplement or as a paper reprint. For the microfilitie, order document E84-001 at \$2.50 [U.S.) from AGU Fulfillment, 2000 Florida Ave., N.W., Washington, p. 20099. For the paper reprint, order SEAN Bulling and SEAN Bulli Fulfillment, 2000 Florida Ave., N.W., Washington, DC 20009. For the paper reprint, order SEAN Bulletin Igiving valume and issue numbers and issue date) through AGU Separates at the above address; the price is \$3.50 for one copy of each issue number for those who do not have a deposit account, \$2 for those who do; additional copies of each issue number are \$1. Subscriptions to SEAN Bulletin are available, from AGU Fulfillment at the above address; the price is \$18 for 12 monthly issues mailed to a the price is \$18 for 12 monthly issues mailed to a U.S. address, \$28 if mailed claewhere, and must be

Volcanic Events

Kilanea (Hawaii): Phase 12 described; tremor and Inflation continue; new ground cracks

Mr. St. Helens (Washington): Renewed extrusion on NE flank; breadernst hombs /eniaminul (Alaska): Vapor plumes; ircanilescence; earthquakes

Paylof (Alaska): Brief ash emission episorles Piton de la Frornaise (Réonion): Lava emission continues; volcanir tremor; must delormation in 1/2-3/4 hour, 2 hours before nre-eruntion seismic swarm

Rahaul (New Britain): More but weaker carrhunkes: deformation slows Bagana (Sulumon Islands): Glow, explosions, incamlescent boulders

Langila (New Britain): Tephra to 2.7 km height; small lasa How Ulawim [New Oritain]: Seismicity increases

after M 6.4, 6.5 cardiquakes Manam (Bismarck Seal: Glow, teplica ejection, explosions at summit craters Kusatsu-Shirane (Japan): Summit explosions

and seismicity Sakurajima (Japan): Tephra from strong exphysiums rlamage cars and lunichings Usu (Japan): fumarole temperatures decline

Atmospheric Effects: Balboon and lidar data and colorful singlets indicate continued

presence of El Chichón acrosols Mt. St. Helens Volcano, Canade Range, S. Washington, USA (46.20°N, 122.18°W). Growth of the compasite lasa dorne has contimed since early 1989. Internal expansion accelerated before the most of lava exposion in February and continued as spines formed in April and a new tobe emerged onto the Ni. Hank about May 1. The lobe advanced and rapid NE flank determation confirmed as rates of ourward movement on the S and SE flanks began to increase in July. In late September lava was redirected to the S side of the active lobe, accompanied by continued vigorous S and SE Hank deformation. Following this shift of activity to the south, advance of the lobe's NE end stonged by the end of October and Nr. Bank deformation was neglivilde les November.

Lava reached the dome's steep upper S and SE flanks in December, spawning numerous tockfalls as the lobe front broke up. Some rockfalls were him enough to become fluidized, moving flown a clinic and spreading ocer a small area of the clarer floor at the base of the dome. The fluidized rockfalls from the front of the NE Bank lobe in August (Eas, October 11, 1983, p. 586) were larger and had stronger seismic signatures. Maximum deformation rates measured on the S and SE sides of the dome dropped from about 50 cm per day in late November peabout 20 cm per day by late December. Hetween December 28 and January 4, values in-

creased sharply to as much as 600 cm per day. New lava appeared on the NE flank inmid-December, forming jagged spires and ridges, but fulle downslope advance was observed, Instead, the lava appeared to have broken through the crust of the riome in a zone that extended about 200 in NE from the summit spine and was about 100 in wide (in a NW-SE direction). Deformation of the NE flank also began to accelerate in mid-December, increasing from below per day to a few centimeters per day by the end ul' the

The dome's summit spine crumbled rapid-, but continued to receive some new lava. As of early January several meters of net height loss appeared to have occurred. Snow had accumulated in the depression that formed in November near the top of the dome, but its NW rim tilted dramatically away from the remainder of the depression,

and n new mound harl grown in that area. Gas and ash ejection from sents high nn the dome continued to occur several times per day. On December 16, a substantial number of breadcrust bombs with a maximum diameter of about 4 cm were found in the crater on snow that had probably fallen 2 days earlier. The bonds were nore vesicular than any material ejected by Mt. St. Helens since the strong explosive activity of March 19, 1982, (Eet, April 6, 1982, p. 220). December SO: emissim averaged 105 ± 25 metric tons per day, a 30-40% increase over October and veniber values, but similar tes rates mea-

sured April-September 1983. Seismic events were slightly more numerons in December, trut maly minus growth was observed in the tate of energy release. There were no obvious changes in seismicity that could be enrichated with changes in artirity on the thanc.

Infurniation Contacts: Donald Swanson and fum Casadevall, USGS Cascatles Volca-

Time

(UT)

0309

Date

December 2

December 21 2232

December 22 0102

December 22 0411

December 30 2353

December 31 0904

nu Observatory, 5-100 MacArthur Blvd., Vanconver, WA 98661; Robert Nurvis, Geophysics Program, University of Washington, Seatde. WA 98195.

Sakurajima Volcano, Kyasha, Japan (31.58°N, 130.67°E). All times are local (= UT

Recorded explosive cruptions from the summit crater of Minamidake were frequent in August (39) and September (36), fewer in Octuber (21) and Nuseniber (16).

In mid-August strong wind carried a large amount of ejecta to the inhabited area around the volcano, damaging cars and houses. On August 14 lapilli as large as 6-7 en in diameter lell on Nojiri, at the fore of Sakurajima 4 km SW of Minamidake, Ineaking or cracking windshields on 10 cars, a house's window pame, and the roof of a lint Radio news from Kagushima reported that windshields on 3 cars were cracked by lamilli as large as 1-3 cm in diameter at Tarumizu Wharl, on the S side of the city (15 km NW of the crater). An exphision at 0153 on August 16 scattered lapidli up to 2.5 sm in diameter between Machiki and Yunsoto (3.5 km SSW of Mirsunidake), where windshields on 26 cars were crackes).

Explosive activity remained strong in Sen tember. Insandescem blocks from an explo sion at 11-18 on September 12 started a flank turest life. A heavy ashifall on September 17 -18 deposited 0.270 kg m² of ash at the Japan Meteorological Agency's Kagoshima Obsersatory [Dt kiii Wf; a Kagoshima streetear derailed on September 19 due to ash on the tracks. An explosion at 1518 on September 20 produced a large an slowk that broke window panes in Kagoshima, and another explosion at 1638 sem lapilli as large as 1 cm in di-ameter toward the N. A total of 5 debus flows moved down valleys on the S flank of Sakuraiima on 1, 10, 20, and 21 Semember. There were frequent bursts of discrete seismic events in September, Bursts on September 19 and 28 lasted for about 10 hours and included large events.

Information Contact: Office of Volcani Observation, Seismological Division, Japan Meteorological Agency, 1-3-3 Ore-mady. Chisoda-ku, Tokyo 100, Japan

Earthquakes

The earthquakes on December 21 and 22 near New Bruan were centered off the island's S coast about 150 km S of Rabard and SE of Clawin tokano

Modified Mercalli intensures were IV at Raband, V at Ulawam, Geologists at the Rabaul Volcano Observatory reput, "Motion at Raband was considerable bin not altring, and no reports of slamage or casualties were received from anywhere in the New Unities islands region. The first earthquake (tiggered 3 left harbour shocks at Rabaul at 0004, 0005 and tigu6 GMT on 22 December, and both earthquakes and their numerous aftershocks may have contributed to causing the seismic crisis which accurred at Ulawim Volcano from 23-26 December.

The shock in W Africa on December 22 killed 443 persons in W faminea, and left about 150 seriously injured, more than 200 missing, and an estimated 15,000 homeless. Damage was extensive in the cities of Gauual and Koumbia about 40 km SE and S of the epicenter and about 250 km N of the capitol of Conakry. At least 16 villages in the area wece ilestroyed. The event was felt throughout Senegal, Ganthia, Guinea-Bissau, Guinea,

and Sierra Leone. The December 31 earthquake centered in NE Afghanistan killed 12 persons in collapsing buildings aml injured at least 10 in N Pakistnn, in the triangular region formed by Chiral (about 150 km SE of the epicenter). Peshawar Jabout 250 km SSE), and Pattan (about 250 km SE). In Kabul, Afghanistan, 6 persons were reported injured and many buildings dansaged.

Information Contacts: National Earthquake Information Service, U. S. Geological Survey Sinp 967, Denver Federal Center, Box 25046, Denver, CO 80225; P. Lowenstein, Principal Government Volcanulogist, Rahaul Volcano Observatory, P.O. Box 380, Rabaul, Papua

Meteoritic Events

Fireballs: Brazil; Czechoslovakia; England; Netherlands (2); New Zealand; Portugal; Illinois, Maryland, Dregnii, Texas, USA; N-central USA-S-central Canada.

Latitude	Longitude	Depth of Focus	Region	
14.05°N	91.94°W	. 65 km	Guatemala	
5.51°S ·	152.47°E	shallow	New Britain	
5.50°S	152.47°E	shallow	New Britain	
1 L98°N	13.54°W	10 km	NW Africa	

70.97°E 154 km

136.86°E 389 km

Earthquakes

36.34°N

35.83°N

*University of California, Berkeley. **Lamout-Doherty Genlogical Observatury, Palisades, N.Y.

Mnguitude

7.1M.*: 6.7M.**

6.4ML; 6.4M.

6.5ML; 6.5M

6.3m_b; G.2M_a 7.0m_b

7.0ni

NE (Afghanistan

The Oceanography Report



H U.S. Carrierate entranto do Salar.

The focal pant for physical, chemical, geological, and biological occurregeapheri

Editor: Aquald I. Tardan, Lannut-Italicus Gralogical Obtetsanny, Palisades, NY 10951 (telephone 914-359-2900, est. 325)

The Year in Review

D. Jomes Bakey

This article is not a summary of all or even most of the important and interesting activities carried out in occanography during the paotycar; the held is simply too large and artice for that, the must book to the periodic reports of the international Union of Beodesy and Googlesias for a proper summary. Rather, this is my view of some of the scientific and programmatic events this year that could have interest for the readers of Eos.

The year 1983 was on exciting one, lifled with interior activity by occanographers in all disciplines. The year started with confirmation that we were indeed experiencing a major and primaral El Niño. The awareness of the role of the occan be change variation was enhanced both by the severity of the El Niño and the new reports on the effect of increasing CO2 in the amorphere.

The year commed with remarkable demonstrations of the power of satellite-home instruments to reveal new physical, biological, and geological features of the ocean. We saw the retirement of the Glomar Challenger as a deep year driffing viewel after 15 sincressful tears and the start of a major new driffing program destined to be absorted a larger vessel. The year ruled with planning for new, expanded undies on the interaction of the moph alocean with the global atmosphere and on the general circulation of the ocean. The prosperts of global studies of hiogeochemical fluxes were under discussion.

Much has already been written about the strength and development of the 1982–1983 F.I. NimySouthern Oscillation which (thanks to the early planning efform of scientists in the NOAA Equatorial Pacific Ocean Climate Studies program and the NSF Pacific Equatorial Ocean Dynamics program) was one of the best-the unicated ever. A full review of the oceanography, meteorology, and biological consequences of the event is available in the

AGU Congressional Science Fellowship

The Individual selected will spend a year on the staff of a congressional committee or a House or Senate member, advising on a wide range of scientific issues as they pertain to public policy questions.

Proapective applicants should have abroad background in science and be articulate, literate, flexible, and able to work well with people from diverse professional backgrounds. Prior experience in public policy is not necessary, although such experience and/or a demonstrable interest in applying acience to the solution of public problems is desirable.

The fellowship carries with II a supend of up to \$28,000, plus travel allowatrice.

Interested candidates should submit a letter of Intent, a curriculum vitae, and three letters of recommendation to ACKI. For further details, write Member Programs Division, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009 or telephone 462-6903 or 800-424-2488 outside the Washington, D.C., area.

Deadline: March 31, 1984

articles by Cune [1983], Ramusen and Wallace [1983], and Backer and Chovez [1983].

It is worth noting here that the unusual

erolation of the event caught muny oceanog-raphers by surprise (G. Philander, Cumments on the 1982-1983 El Niño, appublished manuscript, 1983). During a typical event, exceptionally warm surface waters first appear ff Peni and Ecuador in January and February and then expand westward. However, as e as September 1982 conditions off Sauth America were still normal, At the conference nn El Niñu at Princeton in October 1982 spansared by the Committee on Climate Research of the National Research Council. there was controversy over whether or not an El Niño was in progress. In reality the event hall already started in the western tronical Pacific in May 1982 and was expanding eastward. The event persisted into July 1983, and ly early September conditions were only

The Committee on Climate Research [National Research Council, 1983a] notes that the 1982–1983 event had an exceptionally large amplitude and was associated with minisual climatic events around the globe. Sea levels dropped in the western Pacific and flooding occurred in tital estuaries in South America. Dramatic shifts in precipitation patterns were observed. Widespread drought occurred overstralia, Indonesia, Southern India, Sri Lanka, and Africa. The impact on lisheries of the loss of upwelled, nutrient-rich water was severe and widespread. Overall, the mercorological and ecological effects associated with other event directly affected the lives of hundreds of millions of upwelled lives also over the model.

ilreds of millions of people all over the world. The El Niño emphasized the need for new stolies in the troples. Interannual climate variability is of major practical importance, and tropical air-sea interaction is key to Interannual variability. It is in the tropics that the ocean and the amorphere are closely coupled on these monthly to interannual time scales. There is a growing belief that the El Niño/Southern Oscillation is not just a collection of isolated and independent oceanographic and interactions letween the tropical Pacille Ocean and the global atmospheric circulation are the primary driving furce.

It is this belief that is driving the planning for part of the oceanography of the World Climate Research Program (WCRP), sponsored by the World Meteorological Organization, the International Council of Scientific Unions, the Intergovernmental Oceano-graphic Commission (IOC), and the Scientific ommittee on Oceanic Research (SCOR). New measurements and modeling of the tropical occan and its interaction with the atmosphere that are essential to improving out derstanding have been identified by the SCOR/IOC Committee on Climatic Changes and the Ocean (CCCO) under a program called TOCA (Tropical Ocean and Global Atmosphere). Satellite measurements of surface wind stress and in situ studics of circulation and mixing will be important parts of this

In recognition of the fact that the general ocean circulation must be understood before the role of the ocean in climate variability can be chicidated, the second major oceanographic activity of the CCCO is the planning for a World Ocean Circulation Experiment. A number of papers published this year showing the new results that are now possible with global satellite data have helped to support this planning.

port this planning.

The Seasat altimeter data routinued to rereal global information about the shape and variability of the ocean surface, as investigators found implications for study of wind stress, ocean circulation, eddies and meanders, and the marine geoid thanks to continuing support of this data analysis hy the National Aeronautirs and Space Administration (NASA) [see Seaset Special Jone 11, 1983]. To see these features on a global scale, even if only for the 3-month Ser thing fur oceanographers, and much interest has been generated by this work. It should also be nated that the coastal zone color scanner on Nimbus 7, launched the same year as Seasat but still in orbit, has provided the binlagical accamagepathers with another rich sonti e of dato on variability of near-surface chlorophyll and other light-absorbing sub-

International planning is now under way to document the need for a deflicated satellite mission for ocean circulathm. In the summer o workshop on global measurements of the ocean, sponsored by the U.S. Notional Research Council's Board on Ocean Science and Policy and Board on Atmospheric Sciences and Climate concluded that o World Ocean Circulation Experiment (WOCE) was feasible and timely and that detailed planning should

begin immediately.

The overall goals of WOCE, as identified by the workshop, are to determine the 5-dimensional circulation of the ocean for a period ul several years, to improve the description of the atmospheric boundary conditions of the ocean at the same time, to describe the upper boundary layer of the ocean for estimates of water mass transformation, deter-

mine the role of interhasin exchanges, and determine the role of ocean heat transport and storage in the heat budget of the earth. Satellite preasurements of the sea surface slope to yield generophic currents will be a

ey component of this program. In situ measurements will also be key to WOCE, and important new results were reparted this year from such studies. The Transient Tracers in the Ocean program reed a significant and widespread decrease in salipity in the North Atlantic, occurring over the past 2 decades. This implies a relatively rapid response of deep water formation to climatic perturbation [Brewer et al., 1983]. In addition, four new hydrographic sections in the South Atlantic Ocean were completed, thus further extending our baseline information in this area. Evidence continued to build for ronnections between surface processes and sediment deposition through measurements of seasonal changes of the sediments and sediment trap studies in the water col-

During the year a major report on "Changing Climate" [National Research Council, 1983b] was issued by the Carbon Dioxide Assessment Committee, chaired by William A. Nierenberg, director of the Scripps Institution of Oceanography. This report has provided the strongest evidence yet on the serious ronsequences of the predicted general warming of the atmosphere from increased CO2 in the atmosphere. The potential rise in sea level from the melting of the ice caps was noted as a special problem. The crucial role of the ocean in absorbing excess CO2 and hence delaying a warning was noted; but models are still too crude to account for this effect correctly.

As part of the search for observable effects of atmospheric warming due to CO2, a series of papers in recent years has shown an apparent global sea level rise. During the past year, Ramett [1983] showed that the observed apparent rise in sea level globally was probably not due to steric effects from heading. Barnett notes that these conclusions are tentative and that better global data will be needed to draw unambiguous conclusions. We need long time series of mean sea level, temperature, salinity of the ocean, and the extent of sea ice before we can know the true response of the oceans to atmospheric warm-

Ing.

Barnett's work was but one of many inputs into the third major planning effort carried out by CCCO, which was on long-term ocean observations. Francis Bretherton is chair of the committee, which for the first time has laid down a detailed plan for a large-scale observing system based on proven techniques. The committee teport, "Ocean Observational Systems," now in draft, also addresses the unsolved scientific, technological, and data management issues that remain to be solved. The need for limited duration exploratory observing systems and the necessity for the design of pilot observing systems is emphasized in this report.

Techniques for in situ measurements lending to long-term measurements for ocean obng systems reached important milestones during the year. The first intermediate mooting In the Culf Stream (intermediate in the sense of extending up into the stream itself) was recovered this year by scientists from the Woods Hole Oceanographic Institution, showing that such techniques may be ready for use in experimental time series programs. The NOAA Subtropical Altantic Clim. ies program showed a successful use of a variety of techniques to monitor the Culf Stream in the Florida straits. These techniques will be used in the design of a pro-gram to measure heat flux in the subtropical Atlantic as part of the World Climate Research Program. Deep drifters that pop up and report their position by satellite, thus revealing deep averaged currents, were olso successfully tested during the year, yielding mither tool for the study of large-scale circu-

The development of satellite programs for physical oceanography continued as plans became firmer for a Navy Remote Ocean Seosing System (NROSS), involving also NASA and the National Oceanic and Atmospheric Administration. If funded, NROSS will measure surface what stress and wave properties globally starting irr 1988. The Topography of the Ocean Experiment (TOPEX), NASA's initiative for the flight of a precision altimeter to measure accumilely the shape of the ocean surface, received new momentum with a French offer to share the launch and other

The year saw the retirement of the research vessel Glomar Chollenger, whose 96 expeditions since 1968 set an unmatched record of exploration into the least known parts of the earth's crust. The Challenger was the major scogoing facility of the Deep Sea Drilling Project (DSDP), funded by the Notional Science Foundation and operated by the Scripps Institution of Oceanography. The project has been guided scientifically by a number of international parels and committees, under the auspices of the Joint Oceanographic Institutions for Deep Earth Sampling, currently a

300 (04)

group of 10 U.S. and 5 non-U.S. institution. Major scientific accomplishments of the DSDP such as verification of the sea floor spreading model, demonstration of the large-scale vertical movements of the sea floor, and the reconstruction of past chemical, physical, and hiological ocean environments that were different from those of the present have already made international scientific headlines. However, the DSDP's most enduring contributions have been the building of a reconnaisance-scale geological section of the sediments and surface of the hasalt basement that constitute the upper part of the oceanic crust.

However, the recommaisance section is based upon only one data point for each 250,000 square miles of the world ocean. It is clear that further investigation of this section, its variations, and its relation to confinental crust hold the promise of major advances in understanding the history, composition, structure, and resources of the earth. For these reasons, the international marine geo logical and geophysical community has deret-oped a new drilling program based on a larg-er and more capable drilling ship. The new Ocean Drilling Program is now in the process of selecting a ship from a commercial contractor. The program, funded by the National Science Foundation, will again be guided y the Joint Oceanograp[hic lostitutions Deep Earth Sampling. It will be operated from Texas A&M University; the first expedition is scheduled for late 1984 [Eos, January 31, 1984, p. 33).

During the year, the geology and geochemistry of hydrothermal venta temained a preoccupation of marine scientists. Of particular interest are the fluid-rock interactions and sulfide mineralization processes. The biological communities in and around these vents also were a major focus for biological oceanographers and marine biologists, who continue to explore the biochemistry and biology of these apparently unique organisms, iocluding bacteria that can live at 300°C.

New technologies showed the way to new descriptions of geophysical phenomena. The side-scan sonar and multibeam echosumding instruments [Farnari et al., 19fi3] give a 2-dimensional view of the ocean floor. The tectonics of ridge crests is beginning to be studied in earnest with these and other techniques.

Satellite techniques were also important to the geophysicist. A full view of the large-scale features of the ocean flour, as reflected in the shape of the ocean surface, was produced fot the first time from Seasat altimeter data [Haxby et al., 1983]. In addition, it was shown that new processing techniques allowed the extraction of geological features on scales on the order of 50 to 100 km with special processing techniques. These new pictures can be used to locate seamounts and other small-scale features of the ocean floor.

Of special note on facilities in addition to the planned new vessel for ocean drilling: the Atlantis II, originally designed as an all-purpose oceanographic research vessel, was reconfigured to operate as a tender for the submersible Alvin, thus giving the latter a much latger range and providing oucli-needed space. An ocean modeling facility was in the planning stages at the National Science Foundation, with access to an Advanced Vector Computer at the Notional Center for Atmospheric Research being the control element.

spheric Research being the central element. Among those organizations of interest to oceanographers, the National Research Council (NRC) plays an important role. During the year, the NRC recombined the Ocean Sciences Board and the Ocean Policy Committee into a single Board on Ocean Sciences and Policy (Eas, June 7, 1983, pp. 402–403). The new board's terms of reference include charges to continue oversight and stimulation of ocean sciences, help formulate marine policy, and help clarify scientific issues that affect ocean policy. At the same time, Richard C. Vetter who had served as executive secretary of the board in its many manifestadons through the years, retired; AGU's Ocean Sciences Section presented him with its Ocean Sciences Award for his outstanding service.

Under the leadership of the new chairman, John Slaughter, Chancellor of the University of Marylond, and Nancy Maynard, the newly appointed executive secretary, the Board on Ocean Sciences Policy immediately began olnnning for a major study on "Nation Strategies for Ocean Science and Policy to the year 2000." The study will articulate community consensus on issues critical to improving ocean science and policy in the next 2 decades and by so doing provide guidance to those involved in ocean science and policy decision making. The study is being developed by the board in response to a long-standing need by the ocean agencies for a long-range plan for the ocean sciences and related policy

The study will be carried out in two patts. In the first part, a disciplinary one, a balanced panel of experts will critically assess to files and identify those research areas within the field that are likely to return the highest scientific dividends as a result of new support. This phase will be carried out in the first half of 1984. The second part will build

on the results of the first to identify linkages which could yield fruitful advances in either science ar policy. Wide community invalvement is expected in this effort which, if successful, rould reap benefits for the ocean sciences far a long time to come.

As the year ended, the announcement by the U.S. Government that it planned to pull out of the United Nations Educational, Scientific, and Cultural Organization injected uncertainty into the U.S. role in the Intergovernmental Oceanographic Commission, a key component Of operational oceanographic measurements. Long-time observers of the scene urged cautian in drawing cunclusiuns as to die effect of such a U.S. action, but such a change could hare major effects on the formalities of international planning.

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Cover. Raw sidescan sonar image made by U.S. Navy fast frigate Robert E. Peary. The unusual geometry created by foreshortening and proximity to ship track (top of image) gives the image's uppermost portion the appearance (and to some degree the function) of a ronventional reflection profile while portions immediate below are close to plan view. Left half of image illustrates two different compressions for the same trace. The 30 km \times 900 km image (along about 14°30'N) illus trates four Mariana basin seamounts: two new discoveries (the two smaller ones). one guyot (flat top) and a seamount in th process of entering the Marianas trench (the depression to the tight). The sharp edge larrow) suggests breakup of this sea mount has already begun, 50 km from the 9000-ni deep trench axis. Current rates of tion within I million years. The trench itself nicely illustrates the steeper downgoing side to the left and the horst-and-graben fault blocks on thre forearc side to the right. (Photo courtesy of Peter B. Humphrcy, University of Hawaii, Institute of cophysics, Honolulu, HI 96822.

An Invitation Would you like to be on the cover of

Eas? If you have any illustrations with both aesthetic charm and scientific interest—photographs (preferably black and white) of geophysical phenomena, experimental results, or graphs—Eas would like to consider them for publicadon on the cover. Send the original illustration or 8 x 10 inch (20 x 25 cm) glossy photo with a short (50–200 words) explanation that can serve as a caption. You may also submit a more extensive news Item or even a short article to accompany a proposed cover. Captions will be by-lined. If the material has been previously published, please supply a copyright release from the copyright owner. Send it to Eas Cover, AGU, 2000 Florida Avenue, N.W., Washington, DC

On a more positive note, a number of ocean groups, including federal, industrial, and private organizations, are now actively planning for a year-long pragram of ocean awareness to be called the Year of the Ocean, starting March 10, 1984. The date is clusten as the first anniversary of the U.S. proclamation an the Exclusive Econumic Zone. The exercise of soverign rights for exploring, elevelaping, conserving, and managing the living and nonliving resources of the sea requires an initiation of new activities; the new year will see many of these.

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D. James Baker is president of Joint Oceanographic Institutions, Inc., 2100 Pennsylvania Ave., N.W., Waslangton, DG 20037.

News & Announcements

AGU Ocean Sciences Award: Robert E. Wall

The Ocean Sciences
Section of ACU recognizes the important,
longstanding contributions of Robert E. Wall.
Bob is rapidly approaching 20 years of
dedicated and selfless
service to the administration and promotion

service to the administration and promotion of ocean sciences within the federal government. He began his professional career as a staff scientist for marine geology and geophysics in the Office of Naval Research in the mid 1960's. In 1970 he moved to the National Science Foundation (NSF) as a program manager for maone geology and geophysics. In 1975, he was promoted to Hesd, Oceanography Section; Bob is now Head, Ocean Sciences Research Section.

tion.

Through all of this, 80b has managed to maintain a strong commlunent to making the bureaucratic system work and to be concerned about the needs and goals of the individual scientist while recognizing the limitations and pressures within NSF. And he hos maintained a sense of humor and his own personal integrity. His management philosophy is driven by a deep roncern for the health and vitality of the ocean science community. This has translated into program-level operations which are driven by science.

80b was educated in physics at Carlton

Bob was educated in physics at Carlton College and later obtained a Ph.D in marine geophysics from Columbia University and Lamont-Doherty Geological Observatory. From this background, lie has developed a groug interest in, and an impartial nititude toward, oll aspects and subdisciplines of oceanography.

3ome specific contributions made by Bob within NSF include the following:
He provided much of the intellectual guidance in merging "big" and "small" science at the end of the international Decade of Ocean Exploration. He has worked hard to maintain

Exploration. He has worked hard to maintain NSF's capability to support science across the full spectrum of project size and interdisciplinory content. For this, he was recognized by an NSF Special Achierement Award in 1981.

He has worked diligently to incorporate into facilities planning the perceptions of the research section on stilp and equipment

needs. He was instrumental in forming the first NSF rescarch and facilities staff group to

examine long-range needs.

He has maintained an acute awareness of the problems and research apportunities facing the community. Through publications, such as his orticle in Eas and presentations at AGU meetings, he has worked to keep the community informed of NSF/Division policies and activities. He has also led the light to maintain proposal review panels as one of the methods of direct community involvement in the decision-making process.

He is a champion of the peer review system. Bob was also one of the first NSF managers to take action to set up ad hoc review committees to examine how well and how fairly his pragrams were utilizing the review system. The results A page with his pragrams were utilizing the review.

system. The results: A pass with Hying colors. Bob is an unassuming and mindest individual. He is smart, thorough and strong—unusually strong for a person so compassionate about other people. For almost 15 years he has been a stabilizing influence for the good of academic ocean sciences in NSF and elsewhere. Not incidentally, Bob served as secretary of the AGU Oceanography Section in 1972–1974. It is high time he received recognition for his contributions to our science.

In summary, Bob Wall is truly an onsung hero, the kind of honest, dedicated, and effective administrator who we are all pleased to support in a position of responsibility in Washington, D. C. He is living testimony that "the system" can and does work with quality people in place. What is even better is that we can hope he will serve for another 20 years, quietly doing his important job seprethly.

For the Ocean Sciences Section: Christopher N. K. Moners

Joseph L. Reid President-Elect

Peter G. Brewer Secretary December 1983

Ocean Drilling Update

Although planning for the first year of the Orean Brilling Program (ODP) is well moder way, the National Science Foundation (NSF) invites proposals from U.S. scientists and institutions for scientific and technological activities that "serve to emich the scientific return from ocean drilling and ensure that ocean drilling is emplored to the best advantage," according to Herman B. Zummerman, ODP program associate for science coordination. Drilling operations for ODP are expected to begin in Denoher (Eo., January 31, 1984, p. 33).

In the United States, NSF supports participation of U.S. scientists through the research support component of ODP. This support focuses on investigations of potential drilling regions, including studies that combine aspects of continental and marine geoscience; downhole geophysical experiments and development of related instrumentation; and workshops and other activities that focus on problem delimition prior to drilling operations, Zimmerman said. To be considered for support, proposed projects must be clearly relevant to the drilling plans of the international community and focus on pre-drilling or drilling-concurrent activities, he explained. Where appropriate, proposals may be considered jointly by ODP and other research support programs within NSF and within other

agencies.

Proposals may be submitted at any thre and should he addressed in the ODP office, which has returned to the main NSF building at 1800 G St., N.W., Suite 1133, Washington, DC 20550 (telephone: 202-357-9848). Sandra Toye Is ODP program director and Al Sutherland is associate director. (U1P is under the aegis of NSFs ocean sciences division (Eos, July 5, 1983, p. 443).

Science direction for ODP is provided by the Jaint Oceanographic Institutions for Deep Earth Sampling (JOIDES). International participation in ODP will continue. In addition to the United States, membership in JOIDES is expected to include France, the United Kingdom, Japan, the Ferleral Repulsic of Germay, Canada, and a consortinut of European nations represented by the European Science Foundation, Each member contributes to the Imancing, onlocard science operations, and participates in science planning.

Geophysical Surveys

Joint Oceanographic Institutions, Inc., (JÓI), a consutium of 10 major U.S. occarographic bisitomors, was recently awarded a contract from the National Science Formulation to manage ODP (Em. January 31, 1984). . 33). 1OI also pranages the U.S. portion of the site surery program for ocean drilling. The survey program requires high-resolution geophysical surveys to facilitate sue selection. n preparation ho deep ocean drilling Organizations with the experience, ability, and interest to combact required drep ocean geo-phosical survery finelading swath map you veval should submit a written request for a copy of the solicitation realled 1011. Inc., RFP #1-84) from JOL Inc., 21% Pennsylvania Ave., N.W., Room 316, Washington, DC. 20037, attention: Andrew A. Luhtanen. The efforts during 1984-1985 initially will focus on the Kane fracture zone and the Unite traple innetion.

Books

Les Granites des Complexes Annulaires

Manuels et Methodes 4. Bernard Bonin, Bureau de recherches géologiques et minières, Orléans, France, 183 pp., 1982, in French.

Reviewed by Peter Bowden

This book, Manual and Methods 4, published by France's BRGM, together with a mouthwa-tering preface by R. Black promises much for the student of ring complexes. It consists of four distinct chapters, each divided into a comber of subsections, with 52 text figures and 9 tables. Although in reality it is based on a doctoral dissertation concerned with the newly discorered ring structures in Corsica, it s spiced with references to past and present research in Nigeria, and observations from French expeditions to the Kerguelen Islands. There are also brief commentaries on the author's obserrations in New Hampshire and Massachusetts. The text effectively represents a distillation of knowledge concerned with oversaturated alkaline magniatism in continental and oceanic settings. The book has a good bibliugraphy with English-language scientific literature references up to 1980. While aware that ring-complex compositions can be variable, ranging from cale-alkaline to alkaline, the author restrict his writings to granitic and related tocks of the alkaline and peralkaline spectrum.

peralkaline spectrum.

Chapter I reviews the types of structures occupied by the granites and their mode of emplacement. This introductory section considers in detail thre formation of ring structures in Corsica. These are Permo-Triassic in age, A-type granitolds of short-time duration following the main compressional tectonic regime of the Hercynian. These are several good field sketches with diagranimatic interpretations which may be valuable as a field guide to the Corsican ring complexes.

Bonin then launches into a series of theoretical observations based upon published scientific literature concerning the geometry of ring complexes (shape, average diameter, etc.) and the ascent and subsequent cooling history of magnatic liquids in ring dykes. This is followed by a nine-page commentary on the mode of emplacement of ring com-

plexes, paying particular attention to the Glencoe and Valles models, and the Ramberg experiments. The chapter ends with speculation on the source region for atkaline magmant liquids.

Chapter 2 gives details about the textures of alkaline granites and related rocks and provides a summary of their petrology and mineralogy. The value of this chapter varies considerably. For example, the feldspar sec-tion is worthy of careful reading, but the olivine and pyroxene sections are given too brief a coverage to be of value. The amphibole discussion is welcome and provides the reader with additional information to be used in conjunction with the excellent article by Giret et al. (Canadian Mineralogist, 18, 481-495, 1980). The micas also are given a good, brief appraisal with some fascinating projections showing compositional variations towards si-derophyllite. The most poignant feature about the amphibole and mica sections is the recognition that certain compositions can crystallize at temperatures below the granite solidus. Chapter 2 closes with a limited discusfrom the meticulous study by Pupin on zircon morphology in alkaline granites, there is only brief coverage of uther minerals.

Chapter 3 enters the realm of geochemistry with annie wi. It diagrams designed to emphasize the magmatic evolution of the alkaline granites. Trace element dota (U, Th; Rtw Sr) provides an Insight into magmatic and postmagmatic processes but the data is restricted, with nu major references to rare earths or other important trace-element discriminants.

The linal chapter (4) ronsists of a petrogenetic review concerned will the origin and evolution of alkaline anorogenic magmatism. Brief excursions are made into the problems of source tegions of magma generation, the ascent of the magma through the crust, and its contamination. The most interesting aspect in this chapter is the discussion concerning the origin of "lindinosite," a mafic-rich (aegirine + alkaline amphibole) rock occurring as enclaves, or within zones of estaclasts in peralkaline granite at Evisa, Corsica. Bonin provides a good synthesis of the world-wide occurrences of lindinosite ond offers an interesting solution to its formation.

Booka (cont. on p.44)

Books (cont. from p. 43)

The principal reservation with this pocket volume is that it is neither a manual nor a "methods handbrock" on granites in ring complexer, as advertised on the framt cover. It is, however, a weboine treatise ou the subject, and provides an extensive theoretical approach perpered with tantalizing glimpses of the author's own research in Corsica coupled with his remarkable grasp of the scientific lit-

Peter Banden u with the Department of Goology, University of St. Andrews, Fife, Scotland KY16

Water and Agriculture in the Western U.S.: Conservation, Reallocation, and

Stod or Water Policy and Management, rol. 2, G. Weatherland (Ed.), Writview, Houlder, Colo., xriic + 269 pp., 1982, \$25.

Reviewed by William B. Land

Markets

Water conservation has long been an imqualified good in the western Pinited States. But when wenterners have full "conservation," they have usually meant reservoir notage to prevent water from escaping downuteam before it could be diverted and put to beneficial use. They took particular numbrage where the Carrer Administration defined it in mean water demand management, a way of arothing or postponing the construction of resettoirs. La oppose resettoir development in the West most certainly is to dely the conventional wisdom and to court political exfunction. It is no brand ourself as dalt or dis-

Several of the contributors to this book are

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academics who are also westerners by residence (if not by idenlingy), and who are well known for espousing the sort of heresy which hrought so much western upprobrium down upon Jimmty Catter. Readers of Eas are now advised that they are at it again. The brok is a report of a series of hossely interrelated research studies, all dealing with agricultural water use in the West, and all those under the spousouship of the John Muir Institute. The theme of the research is the need to reallycate water from agriculture to higher-valued, tom-agricultural user, the institutional equarity for lack of capacity) to do so, and the costs which connervation may impose our some wa-

A sentral distinction running through many of the contributions is that between what Dean Mann calls the "bureaucratic strategy" and the "market strategy" for allocating water. The authors clearly prefer the market trategy, because it accomplishes the required

Upper Atmosphere Research: UBRA Vinitiag-Selentist/Research-Associate Program at NASA Marshall Spare Flight Centee. The Universities Space Research Association [USRA] havine applications for a research position in its Visiting-Scientist/Research-Associate Program at NASA Marshall Space Flight Center, Huntsville, Alabama, in the Atmospheric Sciences Hivisian of the Systems Dynamics Laboratory. The research will consist of theoretical tudies, data analysis, and modeling of the earth's neutral atmosphere above 70 km altitude in cullaboration with NASA/MSFC. scientist. While we particularly seek applications from recent graduates with the Ph.D. degree in atmospheric science, or a related discipling, consideration will also be given to holders of the Masters degree with appropriate experience. The appointment will be for our year frence able); salary is competible.

Applicant a abould aulumic a comprehensive resume and names of these references to Or. M. H. Dassi, USRA, P.O. Box 3006, Boulder, CO 30307. USRA is a man-profit consortium leadquartered in Golumbia, Maryland, sponsored by NASA contract. The Association is an Equal Opportunity/Affirmative Action Employer.

Institute for the Study of the Continents (INSTOCyCornell University. Invited opplications for research associated to work on the COCORP seimic-reflection profiling project or to initiate new programs of crustal study. The Ph.D. degree and training in geophysics or geology are required, and experience in interpreting seismic data on deep crustal structures is required for most positions, send vitze, list of publications, and letters of recommendation to Professor Jack Oliver, Institute for the Study of the Continents, Kinball Hall, Cornell University, Ithaca, NY 14855.

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changes in water use at the lowest costs. They recognize that those costs, even if they are nized, do exist, and that they will fall mostly upon farmers and Indians. But they begin with the presumption that transfers out of agricultural use are necessary, and that what is at issue is only the best way to do it. lu fact, in much of the West the conflict still revolves around whether such transfers are neciled, and not yet on how to accomplish them. But the research reported in this volune clearly shows that adjustment is already well under way, and that Western energies which are now expended upon resisting change might better be devoted to under-

standing and managing it.

The book includes a thoughtful conceptual discussion by Ocan Mann and three quite diverse case nudies of water reallocation and conservation: in the Tulare Basin, in the Navajo Indian Irrigation Project, and in the Central Arizona Project. Not only are these

three settings diverse, but the viewpoints and methodologies of the authors also differ greatly. Finally, the buok includes an examination of water transfer institutions which have evolved in four western states.

This book will not please the practitioners of traditional western water politics; it 100 clearly reveals the outdated basis for that game. Neither will it completely please those environmentalists for whom the new water conservation is an article of faith; the costs of conservation are revealed along with its inevitability. The less committed, however, will find in it a wealth of information about how social change is occurring and reallocation of scarce resources is taking place, as well as many insights into how the process of institutional change could be made more rapid, efficient, and equitable.

William B. Lard is with Policy Sciences Associales, Boulder, Colo., 80301.

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Microprobe Technician-Operatoz/University of Mains at Orono. Subject to budgelary approval, the Department of Geological Sciences at UMO will have this position available by February 1, 1984. Person oppointed must be capable of bringing an automated MAC 400S probe on line as a routine instrument; also able to instruct students on its operation. Similar capabilities with a mass spectrometec highly desirable. Some geologic background preferred. Initial appointment for one year with likelihood of autsequent reappointment. Salary in the range of \$17,000-\$20,000/year. Apply to: C.V. Guidolti, Department of Geological Sciences; University of Maine at Orono, Orono, Maine 04469.

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Assistant Lectareship in Tectonics or Marine Geology/Geophynics: University of Gambridge. Full academic teaching and research appointment. Salary scale pounds 7830 (aged 28) to pounds 9425 (aged 29). Send curricultum vilae and names of three referees to: Administrator, Department of Earth Sciences, Downing Street, Cambridge, CB2 SEQ. UK, by February 27, 1984. Further information and applications may be obtained from above address.

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tems.

Teaching includes two undergraduate courses: a background course in water and solute transport and descriptive treatment of drainage systems and a rourse in design and evaluation of drainage systems. Additional teaching duties include advising of undergraduate and graduate students. The appointes after the research program is established, will be expected to offer a graduate rourse in that research received to offer a graduate rourse in that research area. Research involves study of processes in the management of soil salinity and shallow groundwater, including irrigated cropiands.

Applicants should submit curriculum vita, transcripts, attement of research and teaching interests and background in each, ropies of publications and manuscripts, abstract of dissertation and the names and addresses of at least three references to: Professor O. R. Nielsen, Chair, Search Committee, Department of Land, Air and Water Resources, 121 Velhmeyer Hall, University of Galifornia, Oavia, California 95618, by March 30, 1984. Position is available immediately.

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Postdoctoral Associate/Meteorite Studies. The Harvard-Smithsonian Center for Astrophysics has a postdoctoral opening for a well-qualified recent Ph.O. who wants to advance our understanding of the origin of planets by carrying out petrologic studies of meteorites. The appointment is for one year (renewable for a second year), beginning August 1. Pumiliarity with automated microprobe analysis is essentiall some previous exposure in cosmochemistry is destrable. Please send inquiries to Or. John A. Wood, Smithaonian Astrophysical Observatory, BO Garden St., Cambridge, MA.

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Olrector of Budget sod Planniog. The National Center for Almospheric Research (NCAR), located in Boulder, Colorado, is seeking a Director of Budget and Planning to act as ehief aide and advisor to the Oirector of the Center, to design, execute and oversee NCAR's budget and planning process, develop funding process. NCAR is operated by the 53 institutions of the University Corporation for Almospheric Research under the sponsorship of the National Science Foundation. Requirements for this position include: documented skill in managing the budget and planning functions in a high-terh organization or in a medium-to-large-sized university; evidence of good and consistent judgment, and effective negotiation and decision-making with diverse staff; dorumented skills in writing budget justifications and analysis; documented skill in managing serenal tasks at once, in making priority judgments amning them and in working under tight time constraints; evidence of panicipation on high-level management teams; evidence of familiarity with the Federal budgeting prartices and procedures.

Compensation will be commensurate with the responsibilities of the position and the demonstrated skills of the successful candidate.

Prospective randidates may apply by submitting a letter of candidacy and a currirulum vitae to/or obtain additional information from: G.W. Curts, Director of Personnel/EOP, NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, P. O. Box 3000, Boulder, Colorado 80307.

Equal opportunity/affirmative action employer. Research Associate. The Department of Earth and Spare Sciences at SUNY Stony Brook invites applications for a Research Associate position. Caudidates should be experienced in application of Electron Microprobe and Analytical Electron Mirroscope techniques to geologic materials. The Department has a [EDL 200CK Electron Mirroscope with EDS and will be purchasing a new Electron Prole in 1894. Outles will include equipment traintenance, instruction of graduate students on equipment of graduate students on equipment of search with independent and in runjunction with laculty. Familiarity with computers and Fortrain programming required. A PhD is prefetred. Salary in negotiable, but we anticipate a range of \$18–23K. Send letter of application, resume and names and addeeses of three references by March 31, 1984 to: Dr. Steven Bolden, Department of Earth and Spare Sciences, SUNY Stony Brook, Stony Brook, NY 11794.

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Positioo lo Geophyales (App)led Solid Earth/University of Califorola, Riverside. Visiting lecturer opening beginning I September 1984. Although the initial appointment will be as a Lecturer, and is aumably senewable, the appointment rould lead to a ladder faculty position the following year. Appointment would teach both undergraduate and graduate level coursea in geophysics and tectonics. Ph.O. required, and evidence of excellent potential in basic research in any subfield of applied geophysics will be rousidered. In addition to leaching, research and service ore required of faculty members at the University of California. Applicants should submit a current curriculum vito with names and addresses of three people who have agreed to provide references. Applications should be complete by April 1, 1984; Inwever, late applications may be accepted unil successful randictate is appointed. Send applications to: Dr. Shawn Bielder. Department of Earth Srieges, University of California, Riverside, California 925 1.

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Clsy Minerabogy/Uolversity of Illinois at Urbaoa-Champalgn. The Oepartment of Geology invites applicants for a tenure-track faculty position in clay mineralogy. We are seeking candidates who have clearly demonstrated the potential to be outstanding researchers in the general areas of mineralogy, crys-tallography and chemistry of clay minerals, in the origin, diagenesis, and metatorophism of argilla-teous sediments and whose future research will comblement our existing programs in the petrology cous sediments and whose inture research will complement our existing programs in the petrology and diagenesis of sediments, experimental studies of compaction and of kinetics of burial diagenesis, behavior of clay minerals during deformation, petroleum geology, and stable isotope geochemistry. In addition to the development of a strong research program, the successful candidate is expected to participate in all aspects of leaching and advising at the graduate and undergraduate levels.

The Department of Geology houses a vadety of facilities for clay mineralogy research, including x-ray diffraction and fluorescence units, an atomic absorption spectrophotometer, two NMR spectrometers, an isotope-ratio mass spectrometer, and electron microprobus. Numerous other analytical services are available on campus, particularly at the Materials Research Luboratory where there is equipment for Auger electron spectrometry, x-ray photoelectron spectrometry, scanning electron microscopy, transmission electron microscopy, and ion microprobe studies.

This position is available immediately. PhD. is requited. Rank and salary will be rommensurate with experience and qualifications. For equal consider-

quited. Rank and salary will be rommensurate with experience and qualifications. For equal consideration, please submit a letter of application that includes a statement of current and future retearch interests as well as a curriculum vitae, billiography and the names of at least 3 references willing to comment on your qualifications and promise by April 1, 1984 to Or. Albert V. Carozzi, Chairman, Scarch Committre, Department of Geology, 245 Natural History Ouilding, 1501 W. Green Street, Urbana, IL, Bi801. Phone: 217/353-3008.

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references to:

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University of Oklahoma
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Hydrologist/Georgia Institute of Technology.

Georgia Institute of Technology, School of Civil Engineering, has a termre trark position available in hydrology at the assistant or assoriate professor level. The emphasis is on physical hydrology, ideally urban and surfare water hydrology. Ph.D. is required. Teaching of undergraduate and graduate courses as well as the acquation of Intuition secarch is expected. Send I estimate and list of reference to: Professor J. Edmund Fitzgetald, Iti retor, School of Civil Engineering, Georgia Institute of Technology, Adams, GA 30332.

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Planetary Geologise/Brown University. Tenusce track Assistant to Associate Professor position statting July 1, 1984, or as soon as possible thereafter to teach and conduct research in planetary geologic processes or Earth and other planeta. Research should be un understanding the physical processes (for example, unpact cratering, vulcanism, tectunism) responsible for the origin of planetary surfaces. Applicants unst have Ph.11. in planethology, geophysics or geology. Deadline fine applications is March 1, 1984. Interested parties should send vita and natures of at least three persons we may contact for recommendations in: M.J. Rutherford, Chairman, Department of Gerbogical Sciences, Brown University, Providence, R. 192912.

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Reserveh Position/Department of Oceanography, University of British Columbia. Recent Ph.D. with experience in statistical methods and geophysical fluid dynamics sought to partiripate in the analysis and interpretation of data from an array of cyclesondes (profiting current inetee, CTD systems) and current meters in the Strait of Georgia. The randidate ahould alan have the potential of modeling the observations in terms of the nun-linear low frequency motion of a steatified fluid of variable depth. The position is available as of 1 November, 1981, for a duration of one yeae and may be renewed for a serond year; it will be filled at postdoctoral (ta \$20,700) or tescarch associate my to a \$27,000) level according to the candidate's eye rience. In accordance with Canadias inunigration requirements, priority will be given to Canadian citizens and permanent residents of Canadian citizens and permanent residents of Canadian citizens and permanent residents of Canadian (11) 1984 to Dr. S. Pond, Dept. of Oceanography, 1270 University Blid., Vancouvet, B.C., Canada Voït

Marine Research Associate III. Process, analyze and interpret satellite derived thermal IR data of the Sargassu Sea from the subtrupical convergence in the Gill Steam. Prepare actemific manuscripts on the results emphasizing the near surface nessure dynamics and air/sea interaction. Platt in Physical Oceanography and experience in computer programming. Submit resume by Match 1, 1981, to: Peter Coerillon, Marine Revench Associate III Position. University of Rhode Island, 1930, thex 337, Kingston, Rhode Island, 1984-1957.

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Postdoctoral Position/University of Washington.
Research Associate (postdoctoral) with background in physical oceanography or atmospheric sciences and innerests in dynamical aspects of climate variability. Team of appointment: one (1) year, tenewable for a second year subject in the approval of the Council. Closing date: March 15, 1984. Send curriculum viace and a list of four (4) references to Director. [ISAO, ch. Department of Atmospheric Sciences. AK-40, University of Washington, Seattle, WA 98195.

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Space Plasma Theoreticlan/Princeton University. A postductoral position is available beginning sunniner of 1984 in the Theoretical Division of the Plasma Physica Laboratory, Princeton University, for one year with the possibility of tenewal for a second year. Physicials with a Ph. D. riegree or its equivalent or other relevant discipline are encouraged to apply. The position involves theoretical and numerical simulation studies on space plasma physics under the support of the National Stience Foundation. Interaction with the mendees of the Laboratory engaged in fusion plasma physics is encouraged. Interested candidates thoubits end a resume and three betters of recommendation to: Dr. H. Okida, Plasma Physics Laboratory, Princeton University, Princeton, NJ 08514.

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Postdoctoral Fellowship: Hydrogeology. Applita-tions are instead in a pastdictoral position at the University of Result Columbia. Starting date: July 1, 1984; two years, with possible extension for a third year. Specific research task will require famil-iarity with littlingcologic cristionments, contami-nant transport, and numerical modeling. Open to randishive from Goodogy or Engineering, Salary, at least \$20,700 Conadian. Applications with resumer and addresses of three referees thould be sent to: for RA. Freete, Department of Lecologial Sciences, University of Renich Columbia, Vancouver, R.C., Canoda, Vol 1 20, 500 for Further information, info-pling (1904) 228-6162.

Research Position in Space Plasma and Auroral Physics. I wo cessarely positions at the level of autostant or associate crecarch scientists are available in the Department of Physics & Astronomy at the University of Iowa for qualifical candidates with a Ph.D. direct and constitute in the Physics in the Physics with a Ph.D. direct and constitute in the Ph.D. tersity of lower for quantities cannot are with a critical larger and experience in space plantas and/or attend physics. Present research in space planta physics emphasizes analysis and meropretation of observations of ungueouspheric plantas using instrumentation on burnt earth-orbiting spacecraft in the IMP and ISEE Missions. The University of least and the design instrumentation in the argueouspheric plantas and a presentation with the argueouspheric plantas. the IMP and ISEE Missions. The University of lower a global imaging instrumentation on the space-craft Dynamics Explorer 1 is the source of an extensive that base of auroral images from high altitudes at studie and obrasiolyt wavelength. Photometric observations are alto available for other areas of research tackning the physics of the upper amosphites and the global distribution of atmospheric otone. The applicant nhould identify and describe areas of his or her especifics which can support experimental or theoretical investigations in space plasma plus in a autor nitroral physics. Safary and portion will be determined by the applicants qualifications and experience.

portion will be determined by the apparatur quan-lications and experience.

A resume and the nature of three persons knowl-ralgeable of applicants experience frombil be for-warded to. L. A. Frank, Opparatusent of Physics & Automotivy, Proverny of Lowa, Van Allen Hall, howe City, Lowa 52242.

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Program Manager/Alt-Sea Interaction. NASA Headquarters' Oceana. Processes Illumbria streking cambulars for pluming, developing and implementing a committee research program undring satellite reducing a committee research program undring satellite reducing on the general area of air-we interaction. Specifically included by the near distribute wind brile, and the effect of outlate which on upper-ocean increme. Quality among include the Harblite for communicate effect isch. 2 demonstrated exceptions of our renta Qualdo attont include 11 abilità foi communi-cate elle rischt, 23 demonstrated experience in con-ducting original research, 3) program management experience, and 4) knowledge of phrtical recurring raphy 455 14 15, with adors ranges from \$11,277 in 163,115, runimenturate with experience/education. For hierary information regarding requirements and application procedures write to address below or phone 202-755-3687. Formal applications must he irceived by May 6, 1984. NASA Hradquartri, Code NHP, Washington, O.C.

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Massar husetis Instituto of Technology, Haystark Observatoryi Srientlat/Englineer. The Haystack Observatoryi Sreeking a Scientist/Englineer to work in the field of Very Lang Baseline Interferometry (VI.BI). The Scientlat/Englineer would assist in the elevenlyment of new YLBI data acquisition rectronice as well as avist with the processing and analysis of clais taken for the NASA Crustal Dynamics Project. The applicant should have a Ph.D. or its equivalent in radio astronomy or related field. Some engineering knowledge and experience with electronics is needed and a knowledge of computer and microprocessor programming would be an asset. Please write, enclosing resumes to:

J.T. Karaku

Assistant to the Director Haystack Observatory

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August 16, 1984, to June 15, 1985, Some variation of these dates is possible. Excellent opportunity for indit idual who desires to do research while teaching a very light local in the field of his raperitie. The U.S. Naval Academy, located in historic Annapolis on the shore of beautiful Chesapeake Bay, it near Washington, D.C. and Baltimore, MD. Salary commenturate with applicant's barkground. Considerable latitude of action exists in travel, publishing, etc. Within limitations funding for travil la available. Farned Ph.D. required. Please send resumand distracts of these locations together with the name and state of publications together with the name and addresses in these references to: Professor John F. Hullinan, Chairman, Faculty Statech Committee, Uceanography Department, U.S. Naval Acadesty, Annapalis, MD 21402. Closing date: March 1, 1984.
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The University of New Mexico/Mass Spectrometry. The Department of Leonoge, University of New Mexico, Alfuquempre is sreking applicants for a Research Associate III position in the stable Isompe laboratory. The position includes responsibility for operation and industriance of man spectrometers and high eactiom extraction systems, cample perparation and isotopic analyses. The position also provides opportunities for rollaborative research in isotope geochemistry brailing to publication. A Ph.D. in

geochemistry, inorganic chemutry or physical chemistry with research experience involving otass spectromeny and high raction technology is required. Salary range is \$16,000 to \$24,000. Send a letter of application, resume, and the names and addresses of three individuals willing to serve as references to: Crayton J. Yapp, Department of Geology, University of New Mexico, Albuquerque, NM 87131. Closing tlate for applications is March 1, 1984.

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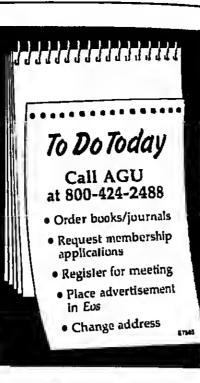
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The North Slope Scrough is a lacel jurirdiction leaunty-like) that occupies most of the Alaskan Arctic, The Borough is very large 188,000 square miles) and sparsaly papulated (approximately 9,000 peopla),

Further information regarding the Arotic Bolanea Prize can be obtained

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STUDENT OPPORTUNITIES

Opportunity for Graduate Study in Igneous Petrology/Isotope Geochemistry—Southern Mithodist University. The Department of Geological Sciences at Southern Methodist University in Dallas, Texas seeks ootstanding individuals interested in a PhD program in igneous petrology and/or isotope geochemistry. The successful applicant should have a strong background in geology, chemistry, and mathematics and an instress in rolranic processes. Research will involve partiripation in a lield-oriented petrological, geochemical, and isotopic study of Late Cenozoic voicanism in the Chitran Andes. For further details and applications please contact either: ther details and applications please contact either: Dr. R. S. Harmon [214] 692-3075

Dr. M. A. Dungan (214) 692-2759 Department of Geological Sciences Southern Methodia: University Dallas, Texas 75275.

AGU Membership Applications

Applications for membership have been recritical from the following unlividuals. The letter after the name denotes the proposed primary straion affiliation.

Henry D. 1. Abarbanel (O), Julia C. Allen (Ht, Gwemlolyn I, Anson (GP), Andrew Bakini (ID, C. A. Bengtson i Fr. Patricia A. Berge (S), Peter R Beizer (O), Pierce Itoivin (V), Michael V. Capobianus (P), Martin C. Chapman (St. Chu-Yong Chen (V). Timothy J. Clarke (S), Steven C. Constable (GP), Michele Dermer (II), G. M. Dow (T), Carl E. Draper (G), Dean A. Dunn (O), I. B. Evermglianr (5)

Parricia Ford-Hall (S), Alberto Giesecke (S), Cyrena Anne Goodneli (V), J. Frederick Grassle (O), Marcann G. Helferte (T), Ola Johanneisen (O). Jelfrey T. Kishl (M). Jelfret Paul Laible (11), Lisa M. Lupez (S), Perer A. Lundberg (O), Kiyoshi Maezawa (SM), Nurwasu Masuria (V), Ronald K. Mathener (V), Cathe McGuire (G), C. Dan Miller (V), J. Deais Newbold (11), Brian C. Nirhols (St. Tevlik, Demir Ozcandarli (D. John S. Perre (A), G. Sirphen Pitts (T), John C, Pohlman (S), John M, Quan (GP), I, D, Ripper (S), Heinrich Rohdenburg (H), Sei-Jeln Sainh (O), Elidro Sakai (GP), Ava Shapira (S), Pairitia Thacker (V), Marvo Unguendoli (G), Jan L. Zigler (D).

Student Status

Raclad Ababon (11), Sandra Anderson-Fontana (1), Craig A. Harker (8), Kenneili Beliiz (II), Horst A. Beger (G), Horma S. Ruxton (II), Cars Wayne Lamor (S), Thomas Candill (M), Craig A. Chesner (V), Sharon A. Chescon (T), Bare Cleary (SA), Debutah M. Crooks (V), Seen Haldgren (Vt. Stott D. Davis (S), Alfred V. Debutest (S), Michael C. Dix (1), Michael Doney Cl.), Rayid M. Gleaton (15), Mark B. Guidon (15), Corrlon Grant (15), Polh M. Groth (14), Wei Min Hate (A), Managa Hermadez Navasz (III. James Hils bank CE. Ebrabeth K. Hill (1).

John I. Isheli (SM), Jellices A. Johnson (1). Weinly C. Fronaud (11), Jordan B. Maler (11), Miriam H. Mi Goveria (V), Oscar J. Mesa (11), Islal Mulnar (S), James E. Nell (SM), Dake I. Ophor (dl), Brent E. Owens (V). Mark H. Parron (GP), Jurge F. Pemarlo (S). Creile Penland De Garcia (O), Willam, R. Pierson [T], Mark Real [H], Richard W. Rubbins (11). Treshiraka Suzuki (VI. Mithael C Pseun | Fr. Zhijing Wang (1).

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<u>Meetinas</u>

Meeting Report

NASA Data Systems Users

A tunsiderable evalution has occurred in the past two decades in the disciplines of solar-icrrestrial and interplanetary physics. Early research was centered around exploratory ntissions in which measurements from individual scientific instruments could be meaningfully employed to advance our state of knowledge. As these scientific disciplines have advanced, a much nure profound, and inter-related, set of questions is being posed by researchers. The result is that present-day investigations are generally much more contplex; large rolumes of data are acquired from multiple sensors on individual spacevraft or from ground-based systems and, quite olien, data are needed from multiple sources in order to address particular physi-

It is clear that research in solar-terrestrial physics during the 1980's and beyond will be desisted to intense multidisciplinary studies ainted at expluring very cumplex physical questions (see the National Academy of Scienves' Solar-Terrestrial Research for the 80's]. It is in this spirit that the NASA Data Systems Users Working Group recognizes that major future advances in solar and space physics will require close collaboration among Investigaturs through interactive exchanges of scien-tific information. Increasingly, scientists spend large amounts of time contacting other

researchers in obtain clara needed to solve given jumblems. Such problems are exacerthe lack of standards for scientific data bases. The net result is that, at present, most researchers reenguize the value of nulticlisciplinary smalles, but the cost in time and effort is devastating to the research elforts. This trend is anothethal to the needs of solar

and space physics research. Some 40 scientists and clata system manage ers met at the Las Alarius National Laboratory July 18-July 18, 1988, to address these problems. The participants are representatives of major space research mganizathous who serve in the NASA Data Systems Users Warking Group (DSUWG), a committee formed in 1980 to advise NASA un matters related to tlata aquilition, storage, and dissemination and currently chaired by D. N. Baker «l Los Alanius.

ward making recommendations to NASA management concerning the establishment of a Space Physics Analysis Network, Other committees within the space science commu nity have come forward recently with similar recommendations. The National Academy of Sciences (NAS) Committee on Data Manage-ment and Computing (CODMAG) is present-ly working on its second major report, which contains as a subset many recor

which are consistent with those of the DSUWG. In addition, the special joint data panel lornied by the Committee on Solar and Space Physics and the Committee on Solar-Terrestrial Research (CSSP/CSTR) of the NAS recently finished its report, and one of its primary recommendations is the establishment of a computer network within the space

Within this framework, the DSUWG recognizes that computer networking holds the most promise of meeting collaborative scientific requirements in the most efficient and cost effective manner for archived, current, and future data bases. The DSUWG therefore recommends that NASA establish a solar and space physics pilot program to create a Space Physics Analysis Network (SPAN) that would link together a large number of NASA space scientists.

The DSUWG recommends that SPAN conform to several further guidelines. The net-work must function so that users' needs are addressed while maintaining a stable environment for facilitating correlative sciantific re-search. The network should be built by using available but state-of-the-art components from hardware dirough software with the idea that SPAN will become a test bed for the design of data systems for future projects. The inclusion of the NSSDC within this network to act as a central library and data catalog center is highly desirable at a very early stage. This same recommendation has been

made by the CSSP/CSTR data panel. The solar and space playsics pilot program should coordinate its efforts with those of other pilot programs within NASA, and with other interested agencies (e.g., NOAA, DOE). We also suggest that SPAN should use as its foundation the current SCAN system based at Marshall Space Flight Center.

This meeting report was contributed by D. N. Baker and R. D. Zwickl of Los Alamos National Laboratory, Las Alamos, NAt 87545 and J. L. Lircen of NASA Murshall Space Flight Center, Huntsville, At. 35812.

Announcements

Seismic Deconvolution

July 18-20, 1984 Selsmic Deconvolution Workshop, Vail, Colo. Sponsor, Society of Exploration Geophysicists. (Sren Treliel, Amoco Production Co., Research Center, P.O. Box 591, Tulsa, OK 74102.)

The program will consist of invited talks, panel discussions, and contributed poster papers on the following topics: mulciple attenuation, practical deconvolution, model validation, wavelet estimation and removal, and quantitative measures of success. The empha quantitative measures of success, The empha-als will be on real data cases, and invited: apeakers will include Ken Larmer (keynore, address), Enders Robinson, Bill Schneiber, Andreis in keyles, Paul Neuman Tancr, Doug Oldenburg, Terry Deeming, and John Burg.

Those who wish to present poster papers at the workshop should send an abstract to the above address by March 15.

Magnetic Anomalies

August 5-17, 1985 Sympusium on Magnetic Anomalies Over the Margins of Continents and Plates, Prague, Czechoslovakia. Sponsor. International Association of Geomagnetism and Aeronomy. (William J. Hinze, Department of Geosciences, Purdue University. West Lafayette, IN 47907; telephone 317-494-5982.)

The symposium will deal with current research in using magnetic evidence to identify and characterize continental margins and the margins of present and ancient plates. Popers will be presented orally, and drose who wish to submit abstracts for the session are asked to notify the symposium convenor by April 1.

Remote Sensing

October 8-11, 1984 1984 World Conference on Remote Sensing, Bayreuth, West Germany. Sponsors. University of Bayreuth, Texas Christian University Ceuter for Remote Sensing and Energy Research, and International Society of Toxicological and Environmental Chemisis. (Leo W. Newland, Dispersion Francisco Chemisis Chem rector, Environment Sciences Program, Texas Christian University, Fort Worth, TX 76129; telephone 817-921-7271.)

The program is divided into two segments, a symposium on resource management and onmental planning (October 8-10), and a workshop on acid rain and hazardous materials (October 11.) Included in the program will be plenary sessions, poster presentations, exhibits, and discussion groups.

All contributed papers for this conference will be presented as posters. The deadline for abstracts is April 1.

Geothermal Resources

August 26-29, 1984 Geothermal Resources Council 1984 Annual Meeting, Reno, Nev. (Geotherotal Resources Council, P.O. Box 1350, Davis, CA 95617; telephone 916-758-

The technical program will consist of presentations on geothermal exploration and development, drilling technology, reservoir engineering, high and low temperature power generation, direct usa, and the legal, institudonal, economic, marketing, and financing aspects of geothermal energy. The deadline for submitting papers is April 2, with format instructions available from the above address.

The Geophysical Year calendar last appeared in the December 6, 1983, Issue.

GAP

Separates

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Exploration Geophysics

D910 Ecopular applications
OFTHRMS SUPPLESSION OF COMMENTS SIGNALS WITH LINEAR
MOYEOUT IN SKIRKIC DATA
M. Sissan [Daparteens of Riccirleel Rugiesecing,
Interactive Computing Laborator, University of
Pictrburgh, Pirriburgh, PA 152611 P. L. Love
This paper presents a new technique for suppression of
scherest signals with linear suveour in selsmic data.
This technique is implemented in two schemes which take
an array of traces as input and produce either one
single trace or another array of traces as output. Two
solvaic applications are discussed in decall. The item
is in the area of separetion of upward and downward
eravailing signals in vertical array solumning, and the
second is concerned with the accessments of ground roli
in convectional land data and cable notes in marine
data, raspectively, in each case, an example of real
selsmic data is presented to liveirare the
elfectiveness of this technique.

GEOPHTFICS, Vol. 15, Yo. 3

0920 Negnetic and electrical methods
INOCCSO FOLARISATION TIME-ORNAIN SQUITMENT AND
STUDIES OFER FIRS BILES OF PIRITYS STRIKE LITER
E. S. Hajunder IDaophysics Lab, Dept. of Occlogic
Jedsvpar University, Culcutte IOO 032, lodia; Ul
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An énduced polerisacion uell designed for model s
moltiple toolces of current paiss widths and constant
described, The percentage polarizibility is estimate
recorded decay potential. Nodel results with different
presented and discussed over a piste-liths body for va
and insignetions. Tield cases are presented for au
model results.

0920 Hegneric and electrical methods EVALUATION OF AN OSSERVATIONAL KETHOD TON ESTIMATION OF

MEMIRENT MAGNETIZATION
C. C. Schastler (Goophysics branch, KASA/Godderf Specs
Flight Center, Greenheit, NO 2077) P. T. Taylor
This yaper systuates on observational method proposed

Reply (Paper 4L0097)

MEETING May 14-18 Cincinnati Ohlo 2 WEEKS ABSTRACT DEADLINE: } | February 22, 1984

For more information or to be placed on a special mailing list, write to 1984 Spring Meeting, AGU, 2000 Florida Avenue, N.W., Washington, DC

> Call for Papers Published In Eos January 10, 1984

by Zietz and Andreasus 1196it for estimating the reasons magnetisation of a body iron seromagnic daratheir method uses the posicion and relative intensity of the meximum and minimum produced by the causative body to inter the declination of and inclination of or the rotal magnetisation vector of the body. A sector of ylots which summarize over 800 modeled fields is presented which linearrate over 800 modeled fields is presented which linearrate over 800 modeled fields is a main field inclinations of 0, 40, 85, 15, and 40 degrees. As a general rule, the method is relatively insusairive for the ascimation of 6 and 5 mear the geomegnetic squarac, but it becomes increasingly magnitive toward the geomagnetic poles. Soweer, the sensitivity is a complicated function of both 1 and 1 at any magnetic latitude. Breasheston of both 2 applicability of this method indicates that under limited circumstances magnetization of the applicability of this method indicates that under limited circumstances magnetization declination d can be satingred, but due to the tero-invel ambiguity inclination of the magnetization of the tero-invel ambiguity inclination of the magnetization is indeterminate.

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GNIO Seismic methods
REMSLANCE PROCESSES OF BORESOLE ACQUETIT AREAT DATA
Cariscopher 4. Fishell idsolumberger-Doil Pessarch, P.O.
Box 301, Bidgefield, IT Offici Thomas L. Marcella
A new method of processing borehole acquetic array
data is described. The method describ strivals by
computing the scalar eachdowse for a large number of
possible strivel times and elownesses. Sating of
semblance are interpreted as arrivals, and their
seasociated slownesses are plotted on a graph whose area
are stowness and depth. The processing makes law prior
seasopilons shour the data and the significant

nacomplicated.

Results of the processing applied to data from a Results of the processing applied to data from a Results davies are presented for both open and cased holes.

(20)HTMLES, VOL. 45, NO. 3

Journal of Geophysical Research

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Eruption Age of o ~100,000-Year-Old Basell From ⁴⁰Ar-³⁹-Ar Analysis of Partially Degassed Xenoliths 1Paper 3B 18751 A. R. Gillespie, J. C. Huncke, and G. J. Wasserburg

A Detailed Record of the Lower Jaronillo Polarity Transition From a Southern Hemisphere, Deep-Sea Sediment

Core (Paper 38)7261

Geomagnatic Paleointensities From Excursion Sequencer in Lavas on Onlin, Hawaii Proper 1315081

Robert S. Coc. Skerman Grounte, and Edward A. Mankinen
Small-Scale Features in the Earth'n Magnetic Field Observed by Megni Paper 381464

Joseph C. Cain, Dave Ray Schmitz, and Larant Muth
Postglacial Rebound Observed by Lageon and the Effective Viscosity of the Lowce

Mantle (Paper 381807) David Parry Rubintam

A Comparison of Satellite Doppler and Oravimetric Goold Undulations Considering Terrain-Corrected Oravity
Data 1Papte 3B1794) A Detailed View of the South Pacific Goold From Satellite Altimotry 1Paper 3B1739) Richard H. Rapp and Chagias Wichiencharoen
Horizogial Strain Across the Wassetch Pront Near Salt Lake City, Utah Pipper 381785;
Richard A. Sany, Robert B. Smith, and Tomas Soler
Topographile Amplification of Tectonic Displacement: Implications for Geodetic Measurement of Strain
Changes [Paper 3B1730]

David P. McTigue and Ross S. Stein The Effect of Rupture Complexity on Estimates of Source Size (Peper 3B1233) Seismolectonics of the Himalayan Collision Zone: Osometry of the Underthrusting Indian Plate Beneath the Himalaya (Paper JB 1694)

A Selanic Refraction Survey of the Imperial Valloy Region, California (Paper 3B1276)

G. S. Fuir, W. D. Monney, J. H. Healy, G. A. McMechan, and W. J. Lutter Induced Submicity in The Geysera Genthermal Area, California (Paper 3B1348)

Shashancous Inversion for Lateral Velority Variations and Hypocenters in the Yellowstone Region Uring Barthquake and Refraction Data (Paper 3B1629)

Attenuation and Envelope Formation of Three-Component Sciencerums of Small Local Earthquaker in Randomly inhomogeneous Lithouphers (Paper 3B 1763) List of Reviewers Information for Contributoro

Geophysical Research Letters

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John A. Eddy

Evidence for no Early Archeen Ocomagnotic Field: A Paleomagnotic Study of the Komail Formation, Barberton Greenstone Bell, South Africo (Paper 4L0075) C. J. Hele and D. J. Dunlop
Anisotropy of Magnetic Susceptibility Data todicating Remagnetization to Diabase Dikes (Paper 3L.1821)
Brooks B. Edwood
The Brooks B. Edwood The Resolving Power of Cross-Borehole Tomography (Paper 3L1997) Anisotropy and Shear-Velocity Heterogeneities in the Upper Mantle (Paper 4L018)

11.-C. Nataf. I. Nakanishi. and Don L. Anderson

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18. Nataf. I. Venus Dayside tonospheric Conditions: Effects of tonospheric Magnetic Field and Solar ELIV Plun (Paper 31.1926)

E. S. Gaffary Venus Dayside tonospheric Conditions: Effects of tonospheric Magnetic Field and Solar ELIV Plun (Paper 31.1926)

R. C. Eighte, L. H. Brace, R. F. Their, and C. T. Russell Pariodic Intensity Variation in [SIII] 953 IA Emission From the Jupiter Plasma Tour (Paper 31.1859)

Flus Transfer Events: Scale Size and Interior Structure (Paper 31.2003)

M. A. Saugders, C. T. Russell, and N. Schapke Electric Field Evidence on the Viscous Interaction at the Magnetapause (Paper 31.1978)

F. S. Motir Upper Hubble Transfer Paper 31.1978) Effect of Strain-Rate Dependent Yield Strength on Crater Scaling Relations [Paper 31,1826] Upper Hybrid Turbulence as a Source of Nonthernal Conthuman Radiation (Paper 31.1918)

P. J. Christiansen, J. Eichele, K. Rönnsark, and L. Steafle
Relativistic Dispersion and the Generation of Auroral Kilometric Radiation (Paper 31.1827)

P. L. Pritchett Stratospheric Sources of CH3CN and CH3OH (Paper 4L019)

Edmand Mural, William Swider, Robert A. Moss, and Sidney Toky

Edmand Mural, William Swider, Robert 11 1885 Edmand Mural, William Swieer, Robert A. Robert St. Research Continents in Currently Not Constrained by Nd and Hi Isotopes (Paper 3L1896)

Joseph Parchett and Catherine Charvel Donald J. DePaolo Modulation of Solar trradiance by Active Regions (Paper 41.0074) Kenneth H. Schatten

1984 AGU

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NATISTATE EXTRATION OF INSPANSION CONTINUES.

STATIST Milig S. Schultz [Digicon Geophysical Imporation, 370]

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In threa-disancional land dera sequisition, the
crossiles disention of the receiver epead is often such
speller than the lutine disention, typically for respond
of economy. Secuse of fundamental vavonumber
limitations in the estimation of racidual electics by
prestate surface consistent methods, surresolved static
errors will pareles through processing to the stack
date, particularly in the crossing direction.

The prosent method involves an emalgais of poststack 3-0 date through the creation of a correlation time surface from creascorrelations of adjacent attack data traces. This rise aurface is decomposed in the wavenumber domain to isoSate and correct some of the spectral composents of realdust sealt errors which are hopped the resolution of prestech approaches. Assumptions are implicit within the meshod regarding the sepocae of true geologic electure. The method is proposed as a edditional procedure to the standard I-D progensing assumes to land data.

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W. I. Chainesder
The Anguler Oistribution of Infrared Radiance's Emerging from Broken Fields of Cumulus Clouds (Paper 3C 1829)
P. A. Nahur and J. A. Wehman
(Paper 3D 1900) Rage: Davies
The Role of Geographic Variables in Explaining Paleoclimates: Results From Cretascous Change Model Sensitivity
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Elic J. Barron and Warren H. Warhington Climate Sensitivity, Energy Balance Models, and Oscillatory Climate Models. 1Paper 3D16971 M. Ghi The Annual Cycle of the Eddy Momentum Flux Due to the Planetary Scale Northern Henrisphere Stumbae Seasonally Forced Waves 1Pages 1C 1927:

Evidence for IS 6-Year Lunss Nodal Drought in Western Nurth America During the Part Milleranton Paper 301/1621

Oroundirvel Oli Radicol Concentration: New Measurements by Opincal Absorption (Paper 3C 1328)

A Measurement of Stratospheric III2 by Ground-Bated Millimiter-Weve Spectroscopy (Paper 3C 1538)

R. L. de Zufra, A. Paritth, P. M. Schamen, and J. W. Samen Measurements of Stratospheric NA, From the Solar Mesosphere Explorer Satellite, I. An Overview of the Results. [Paper 3D Hol]: Results | Paper 3D14-61|

George H. Monn, Divid W. Rusch, John F. Nown, Joseph M. Zawoday, and Charles A. Barth
The Effect of Ulouds un Photulysis Rotes and Otone Formation in the Unpullated Troposphere | Paper 31116821
And Mee Thompson | 1541 And: Mee Hampson Hydrocubon Monocide Emissions from Hormata Burning in Brazil (Paper JETS99)

The Measurement of Extractable Particulate Granic Matter at a Nonathan Area in the Northeastern United States (Paper JECAN9)

Paul I. 1 for, Theodore J. Ancip. and Joan M. Daive.
The Frequency Response of an Electrochemical Orono Sonde and Its Application to the Deconvolution of Orono
Profiles: Physics 3D3R29 Profiles - IPaper 3D1829

Profiles - IPaper 3D1829

An Assessment of Possible (Lzon) -Solar Cycle Relationship Inferred From NIMRUS 4 IRVV II at a 1Paper 191797;
Such d Chaudra

Radiative Heating Rates Near the Stictospheric Countain Paper MD18101

Correlated Observations of Three Diggered Lightning Flasher Dayer MD17851

Correlated Observations of Three Diggered Lightning Flasher Dayer MD17851

Connect P. Holme, Richard E. Orville, Perce Hubert, Louis Burret, and Ambr. Edward By-War Measurements of Atmospheric Patiential (Paper 3C1828)

Reduct H. Holmonth

Characteristics of Ughtning VIIIF Radiation Near the Time of Return Strokes (Paper 301730) Nations Harde Production by Lightning (Paper JC1584) R. D. Hill, R. G. Rinker, and A. Concommon.

Trace Metals in Bernaula Rainwater. (Paper 3C Bob)

F. H. Jickelle, A. H. Koop, and T. St. Church
Sulfate Accumulation in a Sea Bicerel and Dreese Unculation System.

Chaper 5(1996)

Glan R. Corvanal Federal II Mon. A Model of Interfacial Gay Teansfee For a Well-Roughened Sea. (Paper 3C1375) Acide and Related Constituents in Liquid Water Stratiform Clouds (Paper 3C1896)

P. H. Daniel V. E. Schwarts and E. Systeman Mettorological Association: With Aerosof Composition in the Boundary Layer (Expert 1918a))

Peter's Ameri, William H. Mach, and Labor W. Winchester

Brief Reporte
Reduction of Thunderstorm Electric Field Intensity Produced by Corona From a Nearby Library (Paper 1)(1)(200)
Reduction of Thunderstorm Electric Field Intensity Produced by Corona From a Nearby Library (Paper 1)(1)(200)

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